Scenario Selection for Water Management in California

California Department of Water Resources – Climate Change Technical Advisory Group (Revised Draft 8-23-13)

Objective: *Select a manageable suite of climate change scenarios for water management purposes in California.*

Step 1. Filter latest suite of GCMs* for those that do not produce reasonable regional climatologies and distributions of regional anomalies for temperature and precipitation along the West Coast/California.

Culled GCMs (not used/discarded)

This will probably be done using the methodology proposed by Rupp et al. (OCCRI) currently in draft. Needs to be reviewed by CCTAG/DWR.

Remaining GCMs

Step 2. Further refine suite of GCMs by culling those that exhibit poor performance for Temperature, Precipitation, and Humidity for California. (No downscaling)

A) Develop comparison methodology
B) Establish criteria and criteria weighting for measuring performance of each GCM
C) Perform GCM Comparisons

Culled GCMs (not used/discarded)

Parallel Processes

Initiate study to evaluate GCM performance using a decision support tool to compare observed historical and simulated historical periods for use in future scenario evaluation activities

Initiate separate/parallel process for devising scenarios and analysis methodologies for flood protection activities

Step 3. Compile a suite of preferred GCMs for Water Management Analysis

Step 4. Evaluate downscaling methodologies and formulate recommendations
(Process/methodology for doing this as yet to be determined.)

Step 5. Develop recommendations for compressing or reducing the number of individual GCM runs for specific applications

Eg. Step 3 suite of GCMs includes 15 GCMs. However agency X doesn't have the resources to run 15 GCMs x 3 emissions scenarios. For their purpose, evaluating the likely range of potential futures and median impact are most useful. How can they compress the 15x3 runs down to 3-5 or even 1?

* Coupled Model Intercomparison Project Phase 5 (CMIP5)

Water Management Analyses with Vulnerabilities to Climate Change
Analyses of Primary Importance
Surface Water Supply Reliability
Streamflow
Surface Water Deliveries
Carryover Storage
Runoff Timing
Delta Salinity
Environmental Flows
Streamflow
Reservoir temperature
Carryover storage
Air temp
Groundwater Conditions
Hydropower
Streamflow
Carryover storage
Water Demand (Ag and Urban)
Flood Risk
Precip intensity
Precip duration
Antecident soil moisture
Antecident snow conditions
Maximum flows (3, 7, 10 day)
Analyses of Secondary Importance
Wildfire
Agricultural Productivity
Others
Ecosystem Services

Water Management Analyses with Vulnerabilities to Climate Change
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Water Demand (Ag and Urban)
Analyses of Secondary Importance
Wildfire
Agricultural Productivity
Others
Ecosystem Services

Water Management Analyses with Vulnerabilities to Climate Change	Model
Analyses of Primary Importance	
Surface Water Supply Reliability	
Streamflow	Rainfall-runoff
Surface Water Deliveries	Operations
Carryover Storage	Operations
Runoff Timing	Rainfall-runoff
Delta Salinity	ANN+Operations
Environmental Flows	
Streamflow	Rainfall-runoff
Reservoir temperature	Rainfall-runoff+ Res
Carryover storage	Operations
Air temp	GCM
Groundwater Conditions	Groundwater model
Hydropower	
Streamflow	Rainfall-runoff
Carryover storage	Operations
Water Demand (Ag and Urban)	Land Use Model
Analyses of Secondary Importance	
Wildfire	Wildfire model
Agricultural Productivity	Ag Productivity
Others	
Ecosystem Services	Multiple

Water Management Analyses with Vulnerabilities to Climate Change	Model	Key GCM Output Needed
Analyses of Primary Importance		
Surface Water Supply Reliability		
Streamflow	Rainfall-runoff	Downscaled T, P, H
Surface Water Deliveries	Operations	Downscaled T, P, H via R-R
Carryover Storage	Operations	Downscaled T, P, H via R-R
Runoff Timing	Rainfall-runoff	Downscaled T, P, H
Delta Salinity	ANN+Operations	Downscaled T, P, H via R-R + SLR
Environmental Flows		
Streamflow	Rainfall-runoff	Downscaled T, P, H
Reservoir temperature	Rainfall-runoff+ Res	Downscaled T, P, H
Carryover storage	Operations	Downscaled T, P, H via R-R
Air temp	GCM	Downscaled T
Groundwater Conditions	Groundwater model	Downscaled T, P, H, Runoff
Hydropower		
Streamflow	Rainfall-runoff	Downscaled T, P, H
Carryover storage	Operations	Downscaled T, P, H via R-R
Water Demand (Ag and Urban)	Land Use Model	Downscaled T, P, H
Analyses of Secondary Importance		
Wildfire	Wildfire model	Downscaled T, P, H, W_s, etc.
Agricultural Productivity	Ag Productivity	Downscaled T_{ave}, T_{max}, T_{min}, P, H, etc.
Others		
Ecosystem Services	Multiple	Varies

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